

APPENDIX E TO PART 91—AIRPLANE FLIGHT RECORDER SPECIFICATIONS

Parameters	Range	Installed system ¹ minimum accuracy (to recovered data)	Sampling interval (per second)	Resolution ⁴ read out
Relative Time (From Recorded on Prior to Takeoff).	8 hr minimum	±0.125% per hour	1	1 sec.
Indicated Airspeed	Vso to VD (KIAS)	±5% or ±10 kts., whichever is greater. Resolution 2 kts. below 175 KIAS.	1	1% ³
Altitude	−1,000 ft. to max cert. alt. of A/C.	±100 to ±700 ft. (see Table 1, TSO C51—a).	1	25 to 150 ft.
Magnetic Heading	360°	±5°	1	1°
Vertical Acceleration ..	−3g to +6g	±0.2g in addition to ±0.3g maximum datum.	4 (or 1 per second where peaks, ref. to 1g are recorded).	0.03g.
Longitudinal Acceleration.	±1.0g	±1.5% max. range excluding datum error of ±5%.	2	0.01g.
Pitch Attitude	100% of usable	±2°	1	0.8°
Roll Attitude	±60° or 100% of usable range, whichever is greater.	±2°	1	0.8°
Stabilizer Trim Position, or.	Full Range	±3% unless higher uniquely required.	1	1% ³
Pitch Control Position ⁵ .				
Engine Power, Each Engine:	Full Range	±3% unless higher uniquely required.	1	1% ³
Fan or N ¹ Speed or EPR or Cockpit indications Used for Aircraft Certification OR.	Maximum Range	±5%	1	1% ³
Prop. speed and Torque (Sample Once/Sec as Close together as Practicable).			1 (prop Speed)	1% ³
			1 (torque)	1% ³
Altitude Rate ² (need depends on altitude resolution).	±8,000 fpm	±10%. Resolution 250 fpm below 12,000 ft. indicated.	1	250 fpm. below 12,000
Angle of Attack ² (need depends on altitude resolution).	−20° to 40° or 100% of usable range.	±2°	1	0.8% ³
Radio Transmitter Keying (Discrete).	On/Off .....	.....	1.	
TE Flaps (Discrete or Analog).	Each discrete position (U, D, T/O, AAP) OR.	.....	1.	
LE Flaps (Discrete or Analog).	Analog 0–100% range	±3%	1	1% ³
	Each discrete position (U, D, T/O, AAP) OR.	.....	1.	
Thrust Reverser, Each Engine (Discrete).	Analog 0–100% range	±3°	1	1% ³
Spoiler/Speedbrake (Discrete).	Stowed or full reverse. Stowed or out .....	.....	1.	
Autopilot Engaged (Discrete).	Engaged or Disengaged .....	.....	1.	

¹ When data sources are aircraft instruments (except altimeters) of acceptable quality to fly the aircraft the recording system excluding these sensors (but including all other characteristics of the recording system) shall contribute no more than half of the values in this column.

² If data from the altitude encoding altimeter (100 ft. resolution) is used, then either one of these parameters should also be recorded. If however, altitude is recorded at a minimum resolution of 25 feet, then these two parameters can be omitted.

³ Per cent of full range.

⁴ This column applies to aircraft manufactured after October 11, 1991.

⁵ For Pitch Control Position only, for all aircraft manufactured on or after April 6, 2012, the sampling interval (per second) is 8. Each input must be recorded at this rate. Alternately sampling inputs (interleaving) to meet this sampling interval is prohibited.

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[Doc. No. 18334, 54 FR 34327, Aug. 18, 1989, as amended by Amdt. 91–300, 73 FR 12565, Mar. 7, 2008; 73 FR 15280, Mar. 21, 2008; Amdt. 91–313, 75 FR 17046, Apr. 5, 2010; Amdt. 91–329, 78 FR 39971, July 3, 2013]

APPENDIX F TO PART 91—HELICOPTER FLIGHT RECORDER SPECIFICATIONS

Parameters	Range	Installed system ¹ minimum accuracy (to recovered data)	Sampling interval (per second)	Resolution ³ read out
Relative Time (From Recorded on Prior to Takeoff).	4 hr minimum	±0.125% per hour	1	1 sec.
Indicated Airspeed	VM in to VD (KIAS) (minimum airspeed signal attainable with installed pilot-static system).	±5% or ±10 kts., whichever is greater.	1	1 kt.
Altitude	– 1,000 ft. to 20,000 ft. pressure altitude.	±100 to ±700 ft. (see Table 1, TSO C51–a).	1	25 to 150 ft.
Magnetic Heading	360°	±5°	1	1°
Vertical Acceleration ..	– 3g to +6g	±0.2g in addition to ±0.3g maximum datum.	4 (or 1 per second where peaks, ref. to 1g are recorded).	0.05g.
Longitudinal Acceleration.	±1.0g	±1.5% max. range excluding datum error of ±5%.	2	0.03g.
Pitch Attitude	100% of usable range	±2°	1	0.8°
Roll Attitude	±60 or 100% of usable range, whichever is greater.	±2°	1	0.8°
Altitude Rate	±8,000 fpm	±10% Resolution 250 fpm below 12,000 ft. indicated.	1	250 fpm below 12,000.
<i>Engine Power, Each Engine</i>				
Main Rotor Speed	Maximum Range	±5%	1	1% ² .
Free or Power Turbine.	Maximum Range	±5%	1	1% ² .
Engine Torque	Maximum Range	±5%	1	1% ² .
<i>Flight Control Hydraulic Pressure</i>				
Primary (Discrete)	High/Low .....	.....	1.	
Secondary—if applicable (Discrete).	High/Low .....	.....	1.	
Radio Transmitter Keying (Discrete).	On/Off .....	.....	1.	
Autopilot Engaged (Discrete).	Engaged or Disengaged .....	.....	1.	
SAS Status-Engaged (Discrete).	Engaged or Disengaged .....	.....	1.	
SAS Fault Status (Discrete).	Fault/OK .....	.....	1.	
<i>Flight Controls</i>				
Collective ⁴	Full range	±3%	2	1% ² .
Pedal Position ⁴	Full range	±3%	2	1% ² .
Lat. Cyclic ⁴	Full range	±3%	2	1% ² .
Long. Cyclic ⁴	Full range	±3%	2	1% ² .
Controllable Stabilator Position ⁴ .	Full range	±3%	2	1% ² .

¹ When data sources are aircraft instruments (except altimeters) of acceptable quality to fly the aircraft the recording system excluding these sensors (but including all other characteristics of the recording system) shall contribute no more than half of the values in this column.

² Per cent of full range.

³ This column applies to aircraft manufactured after October 11, 1991.

⁴ For all aircraft manufactured on or after April 6, 2012, the sampling interval per second is 4.

[Doc. No. 18334, 54 FR 34328, Aug. 18, 1989; 54 FR 41211, Oct. 5, 1989; 54 FR 53036, Dec. 26, 1989; Amdt. 91–300, 73 FR 12565, Mar. 7, 2008; 73 FR 15280, Mar. 21, 2008; Amdt. 91–313, 75 FR 17046, Apr. 5, 2010]